HAL
open science

Staging and management of axillary lymph nodes in patients with local recurrence in the breast or chest wall after a previous negative sentinel node procedure

F. Derkx, A.J.G. Maaskant-Braat, M.J.C. van Der Sangen, G.A.P. Nieuwenhuijzen, L.V. van de Poll-Franse, R.M.H. Roumen, A.C. Voogd

To cite this version:

F. Derkx, A.J.G. Maaskant-Braat, M.J.C. van Der Sangen, G.A.P. Nieuwenhuijzen, L.V. van de Poll-Franse, et al.. Staging and management of axillary lymph nodes in patients with local recurrence in the breast or chest wall after a previous negative sentinel node procedure. EJSO - European Journal of Surgical Oncology, 2010, 36 (7), pp.646. 10.1016/j.ejso.2010.05.009 . hal-00603547

HAL Id: hal-00603547

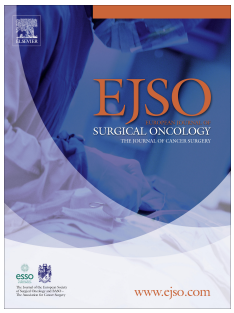
https://hal.science/hal-00603547v1

Submitted on 26 Jun 2011

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Accepted Manuscript



Title: Staging and management of axillary lymph nodes in patients with local recurrence in the breast or chest wall after a previous negative sentinel node procedure

Authors: F. Derkx, A.J.G. Maaskant-Braat, M.J.C. van der Sangen, G.A.P. Nieuwenhuijzen, L.V. van de Poll-Franse, R.M.H. Roumen, A.C. Voogd

PII: S0748-7983(10)00117-4

DOI: 10.1016/j.ejso.2010.05.009

Reference: YEJSO 2971

To appear in: *European Journal of Surgical Oncology*

Received Date: 22 September 2009

Revised Date: 11 April 2010

Accepted Date: 4 May 2010

Please cite this article as: Derkx F, Maaskant-Braat AJG, van der Sangen MJC, Nieuwenhuijzen GAP, van de Poll-Franse LV, Roumen RMH, Voogd AC. Staging and management of axillary lymph nodes in patients with local recurrence in the breast or chest wall after a previous negative sentinel node procedure, European Journal of Surgical Oncology (2010), doi: 10.1016/j.ejso.2010.05.009

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Staging and management of axillary lymph nodes in patients with local recurrence in the breast or chest wall after a previous negative sentinel node procedure

Running title: Axillary staging after local recurrence

F. Derkx [a], A.J.G. Maaskant-Braat [b], M.J.C. van der Sangen [c], G.A.P. Nieuwenhuijzen [b], L. V. van de Poll-Franse [d,e], R.M.H. Roumen [f], A.C. Voogd [d,g]

[a] Faculty of Health Medicine and Life Sciences, Maastricht University, Maastricht, The Netherlands;

[b] Department of Surgery, Catharina Hospital, Eindhoven, The Netherlands;

[c] Department of Radiotherapy, Catharina Hospital, Eindhoven, The Netherlands;

[d] Eindhoven Cancer Registry, Eindhoven, The Netherlands;

[e] Corps – Centre of Research on Psychology in Somatic Diseases, department of medical Psychology, Tilburg University, The Netherlands;

[f] Department of Surgery, Máxima Medical Centre, Veldhoven, The Netherlands;

[g] Department of Epidemiology, Maastricht University, Faculty of Health Medicine and Life Sciences, Research Institute Growth and Development (GROW), Maastricht, The Netherlands.

Correspondence to: F. Derkx, MD, Faculty of Health Medicine and Life Sciences, Maastricht University, P.O. Box 616, 6200 MD, Maastricht, The Netherlands

Telephone: +31-43-3882387; Fax: -

E-mail: floorderkx@hotmail.com

ACCEPTED MANUSCRIPT

ACCEPTED MANUSCRIPT

Abstract

Objective: To evaluate axillary staging and management in patients with local recurrence (LR) after a previous negative sentinel lymph node biopsy (SNB).

Methods: Between 1999 and 2008 130 patients with previous negative SNB developed a LR of breast or chest wall. After examination of clinical records, 70 patients met the inclusion criteria and remained available for analysis.

Results: Thirty-seven patients were treated with axillary lymph node dissection (ALND), followed by axillary radiotherapy in 9 cases. In 26 of these 37 patients no positive axillary lymph nodes were found. Nineteen patients received no treatment of the axilla at all. Of those, 9 were older than 70 years of age at diagnosis of LR. In 13 patients a second SNB was attempted, but was successful in only 5 cases. Eight patients underwent a complementary ALND. Overall, positive lymph nodes were detected in 13 of the 50 patients who underwent axillary staging, either by SNB or ALND. The median length of follow-up of the 70 patients following their diagnosis of LR was 24 months (range 2-81 months). During this follow-up period one patient developed an axillary recurrence. This was a patient who refused to undergo ALND but was given locoregional radiotherapy instead.

Conclusions: In the absence of guidelines for staging and management of the axilla at time of LR of breast or chest wall, many different strategies are being used. Considering the high rate of positive axillary lymph nodes in these patients, repeat surgical staging is appropriate.

Keywords: Breast carcinoma; Axilla; Sentinel lymph node biopsy; Lymph node dissection; Local recurrence; staging

ACCEPTED MANUSCRIPT

Introduction

The axillary lymph node status is an important prognostic factor for disease recurrence and survival in patients with primary breast cancer. During the last decade sentinel lymph node biopsy (SNB) has become a routine procedure in the management of patients with early breast cancer. Numerous follow-up studies have shown that it is safe to omit axillary lymph node dissection (ALND) in patients with tumour-negative sentinel lymph nodes (SLNs).[1-3] However, during follow-up 5 to 15 percent of these patients will ultimately develop a local recurrence on the chest wall or in the breast after mastectomy or breast-conserving therapy.[4,5] The number of patients with local recurrence (LR) appearing after a previous negative SNB is still small, but will increase with the expansion of the cohort of patients who undergo SNB. Currently, little is known about the best clinical approach of the axillary lymph nodes in these patients, especially when there is no clinical suspicion of tumour involvement of the axilla. We postulate that in the absence of evidence-based treatment guidelines, different strategies are in use. Although several studies have shown that a repeat SNB is technically feasible and can provide useful information,[6,7] it remains questionable whether it is a safe alternative to ALND.

The aim of this study was to evaluate axillary staging and management in patients who developed a local recurrence after a previous negative SNB, performed in 14 hospitals in the southern part of The Netherlands.

Patients and methods

Patients were identified by making use of the population based Eindhoven Cancer Registry, which records data on all patients newly diagnosed with cancer in the southern part of The Netherlands, an area with approximately 2.4 million inhabitants. Patient data were derived from 14 hospitals, consisting of large non-university teaching hospitals and community hospitals, two radiotherapy departments and 6 pathology laboratories.

SNB was introduced in the south of The Netherlands in 1995. In 1997, surgeons started performing SNB as a routine staging procedure and since the year 2000 indications for SNB have been described in national guidelines.[8] During the period of 1997–2006, 6800 patients with an invasive breast carcinoma underwent SNB in the South of the Netherlands. Of these, 4094 had negative SLNs and underwent no ALND.

ACCEPTED MANUSCRIPT

In 1989 the Eindhoven Cancer Registry started collecting follow-up information on all patients with breast cancer diagnosed in the 7 hospitals in the *eastern* part of the region, including the data and site of local, regional and distant recurrence. The information is provided by the pathologists, radiotherapists and the majority of the surgeons. Since 2004 follow-up information has also been collected for patients diagnosed in the other 7 hospitals in the *western* part of the region covered by the Eindhoven Cancer Registry.

Until September 2008, 130 women with a locoregional recurrence had been recorded by the cancer registry among the 4094 patients with a negative SNB. After examination of clinical records, 60 patients were excluded. Thirty-six patients had distant metastasis in stead of or prior to LR, 15 patients had axillary metastasis only and medical records of 9 patients could not be retrieved. Eventually 70 patients with a LR remained available for analysis. The medical records were used to collect detailed information on the treatment of the primary tumour and the characteristics of the local recurrence, including the diagnostic procedures and different treatment strategies used for the axilla.

Results

Patient characteristics

Between 2000 and 2008 seventy patients were treated for an isolated local recurrence after negative SLB in the Southeast region of The Netherlands. Characteristics of these patients are presented in Table 1. Diagnosis of the primary tumour took place between 1999 and 2006. The median age at diagnosis of the primary tumour was 58 years (range 29-84 years). The median interval between diagnosis of the primary tumour and diagnosis of local recurrence was 40 months (range 7-99 months). Fifty-two patients underwent breast-conserving surgery at time of primary tumour and 49 of them received adjuvant radiotherapy of the breast. Chemotherapy and/or hormonal therapy were given to 22 patients.

Management of the axilla

The different staging and treatment strategies of the axilla are presented in Table 2. Thirty-seven patients underwent ALND, followed by axillary radiotherapy in 9 cases. In 26 of these 37 patients no

ACCEPTED MANUSCRIPT

positive axillary lymph nodes were found. Patients received axillary radiotherapy because of tumour involvement of the lymph node at the most cranial site of the axillary surgical specimen or because of an irradical resection, according to current guidelines. In one patient, the nodal status could not be given, because the axillary tissue had been completely invaded by tumour tissue and separate lymph nodes could not be identified.

In 13 patients a second SNB was attempted (Table 3). Twelve of the 13 patients had undergone breast conserving therapy (BCT) for their primary tumour. The SNB was successful in 5 patients and one of them was positive. Eight patients underwent a complementary ALND, including the patient with a positive SLN. Two of these patients turned out to have positive axillary lymph nodes.

One patient, who presented without clinically suspicious findings in the axilla and refused to undergo surgery of the axilla, received locoregional radiotherapy without any surgical intervention. Nineteen patients received no treatment of the axilla. Of those, 9 were older than 70 years of age at diagnosis of LR. Distant metastases were detected simultaneously with local recurrence in three of them. In one, ALND was attempted, but was not successful because of fibrosis, probably originated at the time of the primary tumour.

Findings of axillary staging

Pre-operative staging of the axilla by using ultrasound was performed in 14 patients and 5 of them had suspicious findings. Two other patients had suspicious findings in the axilla at clinical examination and one at both clinical examination and ultrasound. All 7 patients with suspicious findings underwent ALND, except for one patient, who already had distant metastasis at time of diagnosis of LR. Positive lymph nodes were found in 3 of the patients who underwent ALND. Overall, positive lymph nodes were detected in 13 of the 50 patients who underwent axillary lymph node staging, either by SNB or ALND.

Follow-up

The median length of follow-up of the 70 patients following their diagnosis of LR was 24 months (range 2-81 months). During this follow-up period one patient developed an axillary recurrence. This was the patient who refused to undergo ALND but was given locoregional radiotherapy instead.

ACCEPTED MANUSCRIPT

Distant metastases occurred in 15 patients. In 5 patients distant metastases were discovered at the time of local recurrence. Seven patients died from breast cancer, after a median follow-up time of 34 months (range 3-42 months) after diagnosis of LR.

Discussion

Our results show that, in the absence of guidelines, different treatment strategies are currently being used for patients with LR of the breast or chest wall after an initial negative SNB, ranging from second SNB and ALND with or without locoregional radiotherapy to no treatment at all. Despite the relatively short follow up, the size of our patient series is quite unique and clearly demonstrates the need for consensus in the management of the axilla at diagnosis of LR of the breast or chest wall.

Reasons to stage the axilla

In our study 13 of the 50 patients who underwent axillary staging appeared to have positive lymph nodes. This is only slightly lower than the percentage of patients showing positive axillary lymph nodes at the time of diagnosis of the primary tumour,[9,10] for whom there is no discussion about the value of axillary staging. To decide if axillary staging should also be a routine procedure in patients with local recurrence following previous negative SNB, we must first consider why staging is done.
Staging can provide useful prognostic information which may help to decide about the need for systemic treatment. In case of a positive oestrogen and/or progesterone receptor status however, patients with local recurrence are candidates for hormonal treatment anyway, irrespective of their axillary nodal status. This decision is supported by results from a randomized controlled trial, which showed an increase of 5-year disease-free survival for patients with local recurrence treated with tamoxifen compared to observation alone (Borner 1994).[11] Until now, the effectiveness of chemotherapy in patients with local recurrence has remained unclear,[12,13] and a randomized study is ongoing to determine the value of chemotherapy in this setting.[14] So, at this moment, the possible need for adjuvant systemic treatment is not a convincing reason to re-stage the axilla in patients with local recurrence.

The second reason to treat the axilla is to improve locoregional disease control. Several trials studying the effects of additional locoregional therapy in patients with high-risk breast cancer have shown an improvement in survival, together with a decrease in the risk of locoregional recurrences.[15-

ACCEPTED MANUSCRIPT

[18] So, the primary reason to re-stage the axilla in patients with local recurrence is to improve locoregional disease control, which in turn could contribute to the reduction of breast cancer mortality.

Axillary staging in the elderly

Almost half of patients not receiving any axillary treatment at time of LR was older than 70 years of age. Different opinions exist about the influence of age on the need to perform axillary surgery at time of breast cancer. Several randomized trials compared ALND with no ALND in elderly women with oestrogen-receptor-positive and clinically node-negative primary breast carcinoma. There were no differences in axillary recurrence rate, distant metastases or survival after 5 to 15 years of follow up.[19,20] Furthermore, ALND does not usually affect systemic treatment choice in the elderly.[21] This might implicate that it is appropriate to omit axillary staging in the majority of elderly patients, especially in those with a proven receptor-positive tumour.

Axillary dissection versus sentinel node biopsy

Once the decision to re-stage the axilla has been made, the next question is how this should be done. ALND is generally considered a safe procedure, but it is also associated with significant morbidity. Up to 50% of the patients undergoing ALND have been reported to suffer from complications, such as seroma formation, lymphoedema and shoulder dysfunction with a subsequent negative impact on quality of life.[22] SNB is associated with a significant reduction in physical and psychological morbidity, as compared to ALND.[23] For patients with primary breast cancer and clinically negative lymph nodes SNB has been proven to be a safe and valid alternative to ALND. However, in patients with LR after negative SNB at time of primary tumour adequate lymph drainage might be obscured by previous surgery and radiotherapy, and for them the role of repeat SNB is not clear yet. In our study a SLN was identified in only 5 of 13 patients undergoing repeat SNB. Other studies have reported much higher identification rates, ranging from 65-97%.[24-26] This difference might be due to sampling error because of the small number of patients undergoing SNB in our study. It could also be related to the level of experience of the various surgeons from the different hospitals or to different techniques used for injection of radioactive material and blue dye.[27]

ACCEPTED MANUSCRIPT

Pre-operative ultrasound of the axilla

Only 7 of 70 patients had clinically suspicious findings in the axilla. A remarkable finding was that the large majority of the patients did not undergo standard axillary ultrasound investigation. In the absence of radiology reports we relied on information provided by surgeons and radiotherapists and therefore some underreporting may have resulted. In the latest version of the Dutch breast cancer guidelines, ultrasound of the axilla is recommended for all patients with pathologically confirmed breast carcinoma.[8] We can not think of any good reason not to perform a routine ultrasound of the axilla as part of a re-staging procedure in patients with a LR.

Conclusion

The rate of positive axillary lymph nodes among patients with local recurrence after breast surgery and negative SNB is too high to be ignored. Therefore repeat surgical staging is appropriate in these patients. Whether SNB is accurate enough in these patients has to be evaluated in further, larger studies.

ACCEPTED MANUSCRIPT

ACCEPTED MANUSCRIPT

Conflict of interest: the authors state that they have no conflict of interest.

ACCEPTED MANUSCRIPT

ACCEPTED MANUSCRIPT

References

1. Roumen RM, Kuijt GP, Liem IH, van Beek MW. Treatment of 100 patients with sentinel node-negative breast cancer without further axillary dissection. *Br J Surg* 2001;**88**:1639-3.

2. Naik AM, Fey J, Gemignani M, et al. The risk of axillary relapse after sentinel node biopsy for breast cancer is comparable with that of axillary lymph node dissection: a follow-up study of 4008 procedures. *Ann Surg* 2004;**240**:462-8.

3. Veronesi U, Paganelli G, Viale G, et al. Sentinel-lymph-node biopsy as a staging procedure in breast cancer: update of a randomised controlled study. *Lancet Oncol 2006*;**7**:983-90.

4. Voogd AC, Nielsen M, Peterse JL, et al. Differences in risk factors for local and distant recurrence after breast-conserving therapy of mastectomy for stage I and II breast cancer: pooled results of two large European randomized trials. *J Clin Oncol* 2001;**15**:1688-97.

5. Jacobsen JA, Danforth DN, Cowan KH, et al. Ten-year results of a comparison of conservation with mastectomy in the treatment of stage I and II breast cancer. *N Engl J Med* 1995;**332**:907-11.

6. Roumen RMH, Kuijt GP, Liem IH. Lymphatic mapping and sentinel node harvesting in patients with recurrent breast cancer. *Eur J Surg Oncol* 2006;**32**:1076-81.

7. Port ER, Garcia-Etienne CA, Park J, Fey J, Borgen PI, Cody HS 3rd. Reoperative sentinel lymph node biopsy: a new frontier in the management of ipsilateral breast tumor recurrence. *Ann Surg Oncol* 2007;**14**:2209-14.

8. Oncoline Oncological Guidelines (*www.oncoline.nl*). Accessed June 8 2009.

9. Voogd AC, van Tienhoven G, Peterse HL, et al. Local recurrence after breast conservation therapy for early stage breast carcinoma: detection, treatment, and outcome in 266 patients. Dutch Study Group on Local Recurrence after Breast Conservation (BORST). *Cancer* 1999;**85**;437-46.

10. Giuliano AE, Barth AM, Spivack B, Beitsch PD, Evans SW. Incidence and predictors of axillary metastasis in T1 carcinoma of the breast. *J Am Coll Surg* 1996;**183**:262-4.

11. Borner M, Bacchi M, Goldhirsch A, et al. First isolated locoregional recurrence following mastectomy for breast cancer: results of a phase III multicenter study comparing systemic treatment with observation after excision and radiation. Swiss Group for Clinical Cancer Research. *J Clin Oncol* 1994;**12**:2071-7.

12. Haylock BJ, Coppin CM, Jackson J, Basco VE, Wilson KS. Locoregional first recurrence after mastectomy: prospective cohort studies with and without immediate chemotherapy. *Int J Radiat Oncol Biol Phys* 2000;**46**:355-62.

13. Rauschecker H, Clarke M, Gatzemeier, Recht A. Systemic therapy for treating locoregional recurrence in women with breast cancer. *Cochrane Database Syst Rev* 2001;4.

14. Aebi S, Wapnir I. A randomized clinical trial of adjuvant chemotherapy for radically resected loco-regional relapse of breast cancer. IBCSG 27-02 / BIG 1-02 (BOOG 2003-02).

15. Overgaard M, Jensen MB, Overgaard J, et al. Postoperative radiotherapy in high-risk postmenopausal breast-cancer patients given adjuvant tamoxifen: Danish Breast Cancer Cooperative Group DBCG 82c randomised trial. *Lancet* 1999;**353**:1641-8.

16. Overgaard M, Hansen PS, Overgaard J, et al. Postoperative radiotherapy in high-risk premenopausal women with breast cancer who receive adjuvant chemotherapy. *N Engl J Med* 1997;**337**:949-5.

17. Ragaz J, Olivotto IA, Spinelli JJ, et al. Locoregional radiation therapy in patients with high-risk breast cancer receiving adjuvant chemotherapy: 20-year result of the British Columbia randomized trial. *J Natl Cancer Inst* 2005;**19**:116-26.

18. Orr RK. The impact of prophylactic axillary node dissection on breast cancer survival – a Bayesian meta-analysis. *Ann Surg Oncol* 1999;**6**:17-8.

19. Martelli G, Miceli R, Costa A, et al. Elderly breast cancer patients treated by conservative surgery alone plus adjuvant tamoxifen: fifteen-year results of a prospective study. *Cancer* 2008;**112**:481-8.

20. Hughes KS, Schnaper LA, Berry D, et al. Lumpectomy plus tamoxifen with or without irradiation in women 70 years of age or older with early breast cancer. *N Engl J Med* 2004;**351**:971-7.

21. Wildiers H, Kunkler I, Biganzolli L, et al. Management of breast cancer in elderly individuals: recommendations of the International Society of Geriatric Oncology. *Lancet Oncol* 2007;**8**:1101-15.

22. Ververs JM, Roumen RM, Vingerhoets AJ, et al. Risk, severity and predictors of physical and psychological morbidity after axillary lymph node dissection for breast cancer. *Eur J Cancer* 2001;**37**:991-9.

23. Schijven MP, Vingerhoets AJ, Rutten HJ, et al. Comparison of morbidity between axillary lymph node dissection and sentinel node biopsy. *Eur J Surg Oncol* 2003;**29**:341-50.

24. Karam A, Stempel M, Cody 3rd HS, Port ER. Reoperative sentinel lymph node biopsy after previous mastectomy. *J Am Coll Surg* 2008;**207**:543-48.

25. Cox CE, Furman BT, Kiluk JV, et al. Use of reoperative sentinel lymph node biopsy in breast cancer patients. *J Am Coll Surg* 2008;**207**:57-61.

26. Intra M, Trifirò G, Galimberti V, Gentilini O, Rotmensz N, Veronesi P. Second axillary sentinel node biopsy for ipsilateral breast tumour recurrence. *Br J Surg* 2007;**94**:1216-19.

27. Povoski SP, Olsen JO, Young DC, et al. Prospective randomized clinical trial comparing intradermal, intraparenchymal, and subareolar injection routes for sentinel node mapping and biopsy in breast cancer. *Ann Surg Oncol* 2006;**13**:1412-21.

28. Maaskant-Braat AJ, Roumen RM. Sentinel Node And Recurrent Breast cancer (SNARB). BOOG 2009-02, NTR1450 (*SNARBgroup@gmail.com*).

ACCEPTED MANUSCRIPT

ACCEPTED MANUSCRIPT

Table 1

Characteristics of 70 patients with local recurrence (LR) following a negative sentinel lymph node biopsy (SNB) at the time of diagnosis of the primary tumour

Characteristics	N
Age at diagnosis primary tumour	
≤ 35 yrs	4
36-49 yrs	19
50-69 yrs	34
≥ 70 yrs	13
Median [range]	58 [29-84]
pT-Stage of primary tumour	
1	47
2	22
Unknown	1
Grade of primary tumour	
I	11
II	26
III	16
Unknown	17
Histologic type of primary tumour	
Ductal	57
Lobular/mixed	12
Mucinous/tubular/medullary	1
Surgical treatment of primary tumour	
Breast-conserving surgery	52
Mastectomy	18
Number of sentinel nodes removed at primary SNB	
1	29
2	26
≥ *3*	10

ACCEPTED MANUSCRIPT

ACCEPTED MANUSCRIPT

Unknown	5
Radiotherapy	
Breast	49
Chest wall	0
Axilla	0
No	21
Adjuvant therapy	
Chemotherapy	7
Hormonal therapy	14
Chemotherapy and hormonal therapy	1
No	48
Interval between primary diagnosis of primary tumour and LR	
≤ 36 months	36
≥ 36 months	34
Median [range]	35 [7-99]
Histology of LR	
Ductal	57
Lobular/mixed	9
Mucinous/tubular/medullary	1
DCIS	3
Extension of LR	
Single focus	44
Multiple foci	16
Diffuse	8
Unknown	2
Type of surgery for LR	
Mastectomy	45
Wide local excision	15
Lumpectomy	5
No	5

ACCEPTED MANUSCRIPT

ACCEPTED MANUSCRIPT

Table 2

Overview of different treatment strategies of the axilla in 70 patients with local recurrence and a negative sentinel lymph node biopsy (SNB) at the time of diagnosis of the primary tumour.

	ALND	SNB alone	SNB + ALND	Axillary RT alone	No treatment
Total number	37	5	8	1	19
Age at diagnosis of LR, yrs					
< 50 yrs	13	1	2	0	4
50-69 yrs	17	2	5	0	6
≥ 70 yrs	7	2	1	1	9
[range]	[30-83]	[37-77]	[46-75]	[75]	[38-86]
Surgical treatment of primary tumour					
BCT	31	5	7	0	9
Mastectomy	6	0	1	1	10
Interval between primary tumour and LR					
≤ 36 months	18	1	2	1	15
> 36 months	19	4	6	1	4
*Clinically suspicious findings in axilla at time of diagnosis LR**					
Yes	6	0	0	0	1
No	31	5	8	1	18
Pathological nodal status at time of LR					
N0	26	3	6		
N1	5	0	1		
> N1	5	0	1		
Unknown	1	2	0	1	19
Radiotherapy axilla at time of LR					
Yes	9	0	1	1	0
No	28	5	7	0	19
Systemic treatment for LR					

ACCEPTED MANUSCRIPT

Chemotherapy	9	0	1	0	2
Hormonal therapy	17	2	2	0	10
Chemotherapy and hormonal therapy	1	0	1	1	2
No	10	3	3	0	5
Distant metastasis after LR					
No	29	4	8	0	14
≤ 3 months after LR	1	1	0	0	3
4 months – 24 after LR	6	0	0	1	1
≥ 24 months after LR	1	0	0	0	1

* Clinically suspicious findings after physical examination, ultrasound or aspiration cytology

RT: radiotherapy, LR: local recurrence

ACCEPTED MANUSCRIPT

ACCEPTED MANUSCRIPT

Table 3

Characteristics of patients with repeat sentinel lymph node biopsy (SNB)

Pt	Hospital (A-F)	Age primary tumour (yrs)	Primary treatment	Duration untill LR (months)	Year repeat SNB	SLN's identified	ALND	Follow up
1	A	42	BCT	50	2007	No	Yes: 0/13	NED 23 months
2	B	65	BCT	40	2006	No	No	NED 25 months
3	B	73	BCT	56	2004	No	No	NED 54 months
4	B	69	BCT	66	2007	No	Yes: 0/8	NED 12 months
5	B	46	BCT	30	2006	No	Yes: 0/14	NED 21 months
6	B	62	BCT	31	2007	No	Yes: 0/10	NED 13 months
7	B	49	Lump	95	2008	No	Yes: 1/8	NED 12 months
8	B	72	Lump	46	2007	Yes: 0/2	No	NED 18 months
9	B	35	BCT	16	2006	Yes: 0/2	No	Metastasis diagnosed at time of LR, † 3 months after diagnosis
10	C	49	Mast	82	2007	Yes: 1/1	Yes: 5/7	NED 20 months
11	D	65	BCT	45	2008	Yes: 0/1	No	NED 6 months
12	E	49	BCT	63	2007	Yes: 0/2	Yes: 0/11	NED 13 months
13	F	60	BCT	74	2008	No	Yes: 0/4	NED 8 months

BCT: breast conserving therapy, Lump: lumpectomy without radiotherapy, Mast: mastectomy, NED: no evidence of disease, SLNs: sentinel lymph nodes, ALND: axillary lymph node dissection.

ACCEPTED MANUSCRIPT